# frica Command Health Symposium

## Health as a Bridge to Peace & Stability

# “Cell Phone Use in Health Care”

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# Agenda

- Mobile Health (mHealth) Background
    - General
    - Africa
- Summary of 11 December 2008 meeting
- Clinical Applications
- Distributed Education example
- Summary
- Possible next steps – demonstration projects

# Contributors

- **ASD(HA) – Akhila Kosaraju, MD**
- **TATRC,USAMRMC – Cynthia Barrigan, RN, MPH**
- **MITRE Corporation**
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  - Don Sparrow

# Cell Phone World Market Background

- By 2009 - 4 Billion cell phone users (half the world's population)
  - over 3 billion more than any other computing or electrical device
  - in AFRICA between 1999-2004, a ten-fold increase from 7M to 70+M phones.
- In 2008 - the worldwide mobile industry became a $1Trillion industry
  - $1 Trillion in 20 years: equal to a growth rate of 30% sustained for 20 years (previously unequalled by any other industry at any time in human history)
- A 1 percentage point increase in mobile penetration in developing countries is correlated with an increase of 4.7 percent of average per capita income.
  - Telecommunications Management Group, 2007
- Mobile phones will change health care delivery and management more than any other single technology

# Understanding Mobile Health

**CONVERGENCE**

- Biopharmaceuticals
- Healthcare Services
- Medical Devices
- Healthcare IT

- Health & Productivity
- Behavioral Health
- Work/Life Balance
- Disease Management
- Disability Management

- Wireless Wide Area Networks (WWAN)
- Wireless Local Area Networks (WLAN)
- Wireless Personal Area Networks (WPAN)

# Cell Phone Applications for mHealth

- Clinical consultation
- Education
- Research
- Biosurveillance
- Disease Management

# Why Cell Phones for Healthcare?

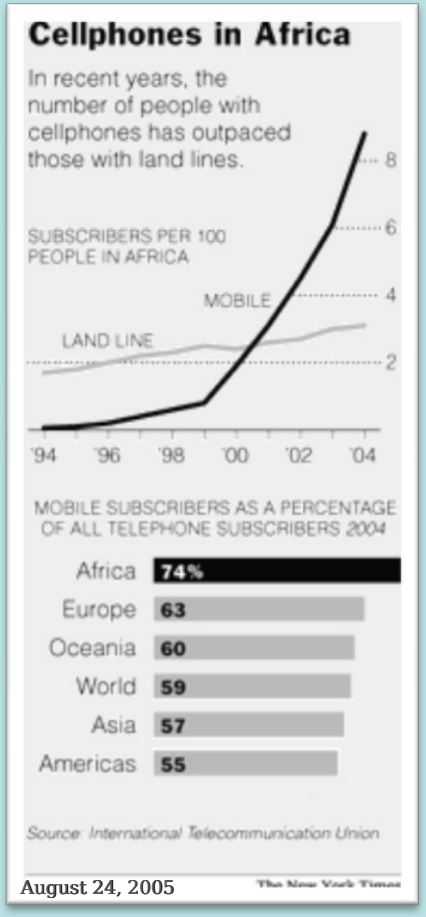
1.8 billion mobile phones in the developing world.

1 million new phones every day.

The explosive spread of mobile phone networks across the developing world has created a unique opportunity to significantly transform how countries can tackle global health challenges.

Dr. Howard Zucker, Assistant Director-General, WHO

# Cell Phone Penetration in Africa




- Africa is the first continent to have more mobile phone users than fixed-line subscribers
  - Approximately 14% of Africans now use mobile phones
- Africa is the world's fastest-growing cell phone market
  - From 1999 - 2004, the number of mobile subscribers in Africa jumped to 76.8 million, from 7.5 million, an average annual increase of 58 percent
  - 95% of the subscriber base in Africa is pre-paid; and since SMS is far cheaper than voice, this indicates excellent prospects for SMS based services tailored to the African market – illiteracy remains a major obstacle to broad SMS adoption
- As Africa continues to liberalize its telecoms markets and open up to further competition and foreign investment, the mobile sector will be a vital component of future growth

# DoD Mobile Health Summit

- Held on 11 December 2008 in McLean, VA
- One-day forum to build the case and define the *roadmap* for the use of cell phones for mHealth and mobile telemedicine in DOD regions of interest
- Assembly of government, private sector, and public health and technology leaders to explore the challenges, opportunities and way forward in leveraging cell technology for multi-sector stability operations
- Meeting Objectives
  - Examine the current and emerging cell-based application of mHealth and mobile telemedicine
  - Assess priority issues within the DOD
  - Explore critical success factors for implementation
  - Identify potential next steps for multi-sector collaborations
- Meeting Summary – www.health.mil

# Mobile Health Summit Panels

- Requirements
  - DOD and NGO perspectives on key needs in developing regions
- Current application of mHealth and mobile telemedicine
  - Lessons learned in implementing mobile health solutions
- Emerging cell-based technology solutions
  - Technology perspective from industry

# COCOM mHealth Requirements Perspective

- Simple, Practical Solutions
  - Avoid “cool” geeky solutions
  - Intuitive and Simple
  - Low bandwidth, simple solutions like SMS text can be very useful
  - Interface hand-held data capture to the communications device
- For solutions to be widely applicable, need to address universally common issues
  - Develop/adhere to standards (air and device interfaces, formats)
  - Security issues
  - Standards-based, open source
- Mesh the Military m-Health with International and Local Infrastructure
  - 3rd Party Intermediaries (portals, hosts, interfaces)
  - Cooperation and interoperability with local mobile service providers
  - Localize solutions, get buy-in (intellectual ownership) and tech transfer
  - Flexible solutions recognizing Cultural sensitivities about technology integration

# Healthcare Environment in Africa, Iraq, Afghanistan

- Lack of healthcare providers, poor infrastructure
- Need for public health infrastructure
- Remote education works well – should be for the population, not just for medical personnel.
- Military need to recognize that many countries have established protocols – these should not be displaced by knowledge obtained during (US) residency
- Common language for NGO and DoD
- “Listen to the locals”—Cultural sensitivity

# NGO Global Health Prospective

- There is a need for information and communications technologies (including mobile communication and computing devices) to support health and health-related areas
  - The emergence of mobile cell phones can provide a cost-effective and secure entry for this need
- African health systems are poor with data management being a major problem
  - Although the Afghanistan health system has achieved considerable gains physical insecurity threatens those gains
  - Iraq requires major health reform due to outdated education, the exodus of a large number of doctors, the physical conditions of the hospitals, shortages of drugs and the health needs of refugees
  - mHealth could relieve some of those concerns
  - The mobile technology facilitates rapid assessments, health education and messaging, disease surveillance, mobile clinics and consultations

# Technology Considerations

- Minimal training required/user friendly human interfaces
- Mix of existing cell phone capability, multiple cell phone service providers
- Go after low hanging fruit such as reprogramming screens for easy/localized data entry
- Take advantage of what electronic methods can do, such as to pull up info in the specific local language
- Authentication and confidentiality are required
- Common Denominator:  GSM Cell Standard (2G, some 2.5G)
  - Voice (person to person – teleconsult)
  - SMS text (persons; automated input & response)
  - Interactive voice (tone-pad menus)
  - Voice conferencing

# Recommended "New" Technology

- Interfaces between data capture devices and cellphone
- Arrangements and provisions for quick interoperability with local wireless providers
  - Could be as simple as arranging for a supply of SIM chips keyed to major African service providers
  - Maximize availability of unlocked GSM or multistandard multiband phones for US military health workers
- For USNS Mercy and other "base" environments, develop and install interoperability solutions (fixed cellular terminals, nanocells)

# Implementation Panels Common Themes

- TEXT Messaging
  - Cheaper and more robust than Voice
  - Greatest Geographic Coverage
  - Down side – requires some literacy
- Original Motivation (CDC)- eliminate paper based data collection
  - Paper is prone to errors, loss, and damage
  - Direct electronic collection eliminates transportation and transcription steps
  - Smart apps can check for logical consistency (reduce errors)
  - Data can be exploited in an actionable time frame
- Next tier of services adds voice and pictures
- Highest tier (3G) offers sophisticated services for specialists

# Key Findings (Paradigms)

- Systems that support Public Health (mostly text)
  - Outbreak detection
  - Health Surveys
- Systems that support Patient Care
  - Text, Voice, Images, Video data,
  - Real Time reach back (video conferencing)
  - Decision Aids (Evidence Based Medicine)
- Systems that support Public Health and/or Patient Care but also can support e-commerce, education, and other distributed management functions.
  - Service Oriented Architectures (SOA)
  - All data types including patient record storage and research libraries.

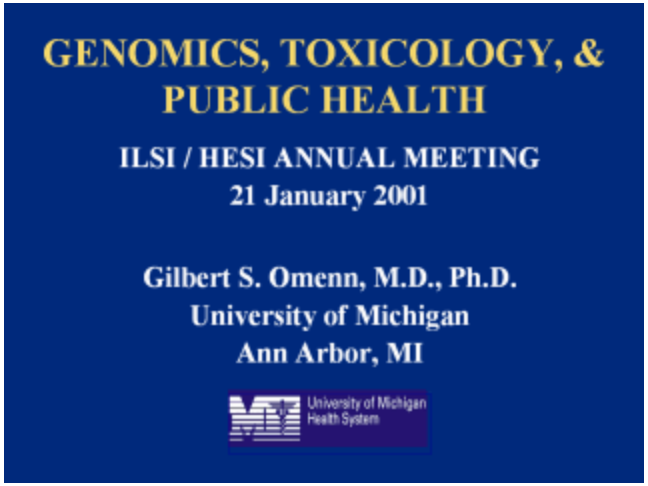
# Additional Technology Considerations

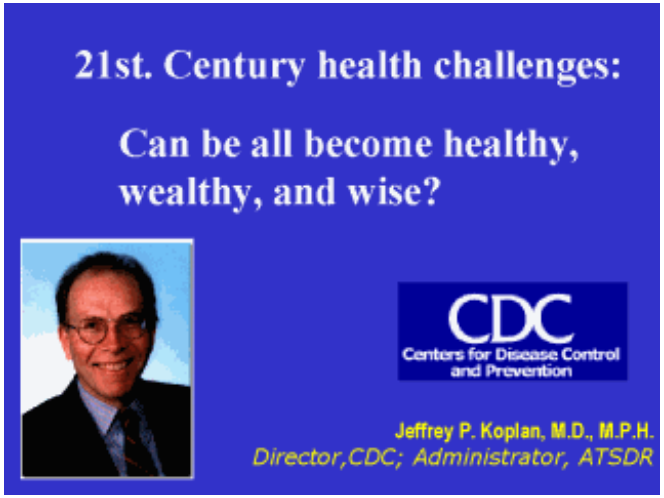
- Many cell phone based mHealth Projects have a strong training component which is considered a key factor in sustaining the project.
  - Local medical personal receive training to enhance skills.
  - Local technical (IT) capability is key.
    - India and China are strong in this area.
- Many projects endeavor to maintain simplicity.
- Recognition of necessity to protect data.
- Local Cell phone networks are often the common medium in humanitarian collaboration between government and NGO organizations.

# Example of a Low Cost Education Program

SUPERCOURSE-global library of PowerPoint lectures on prevention and public health, shared for free by the best faculty members in the world.

**www.pitt.edu/~super1**


GENOMICS, TOXICOLOGY, & PUBLIC HEALTH
ILSI / HESI ANNUAL MEETING
21 January 2001
Gilbert S. Omenn, M.D., Ph.D.
University of Michigan
Ann Arbor, MI
University of Michigan Health System


21st. Century health challenges:
Can be all become healthy, wealthy, and wise?
CDC
Centers for Disease Control and Prevention
Jeffrey P. Koplan, M.D., M.P.H.
Director,CDC; Administrator, ATSDR

# Current Status

Over 58,000 participants (including 2000 from Muslim countries)

42 mirror servers

172 countries

Nobel Prize laureates, former head of CDC, former head of NIH among authors

Over 3600 lectures in multiple formats all available at www.pitt.edu/~super1

# Current Status: Africa

- 800 members from Africa:
  - 111 from South Africa,
  - 94 from Egypt,
  - 80 from Nigeria,
  - 37 from Kenya,
  - 29 from Sudan,
  - 16 from Ethiopia,
  - 4 from Somalia
- Network in Africa includes Chancellors, MOH, professors from Academia, Military, etc.
- One of the very few low cost public health projects on African continent

# Over 42 Mirror Servers across the world

**Further status update:**
**4 mirror servers in Africa), 1 million students taught/year, 100 million hits/year on all Supercourse websites**

# Supercourse to mobile device to TV model

**Less than 10% of the world owns a computer, however over 50% of the world's population has a cell phone. We envision that in the future, Supercourse content will be downloaded through mobile devices and projected onto local TVs in remote regions of the world**

# Future of the network in Africa

- Expansion of network from 800 to 5000
- Distribution of Supercourse CD-Rom to all medical and public health students
- Further development of African Health Supercourse
- Improvement of rural African prevention teaching

# Industry Perspectives

## Current State and Horizon

- Web based decision support will revolutionize mHealth industry
- Anticipated Technology Evolution (applicable to mHealth in general)
  - Interoperability among different wireless networks
  - Data security
  - Rapid access to medical reference data
  - Standards for electronic medical data
  - Development of bio-sensors and low power devices
- Future applications leverage the ubiquity of cell phones, wireless data networks and the Internet to collect valid data and to help patients manage their health and achieve behavioral change
- Wireless technology to build a mobile platform that will integrate with all the bio-sensors for new clinical, diagnostic and therapeutic management applications

**STABLE** **EASY TO IMPLEMENT** **SECURE** **EXPANDABLE** **FUTURE PROOF**

# Key Findings

- mHealth requires solutions that are stable, easy to implement, secure expandable and future proof
- Patients should have access to their health records
- In addition to wireless network, Internet is also a powerful tool for mHealth
- Promote behavioral change
- Promote health education
- Promote private and public sector partnership
- Scarcity of health professionals in Africa is a big issue, so remote health education using wireless infrastructure and Internet will be key for successful mHealth operations on the continent

# DISA's AFRICOM Telemedicine System

- Supports AFRICOM & CENTCOM
  - Uses an existing satellite network that serves SouthWest Asia (SWA) and Africa with a hub in Landstuhl, Germany.
  - Phase one will provide an expanded one-way broadcast capability to existing receive- only terminals in AFRICOM.
  - Phase two will provide a two-way capability (Two to five two-way terminals will be provided to AFRICOM allowing unclassified/classified communications.)
  - The AFRICOM network will employ the use of commercial satellite resources with the eventual transition to DoD's Wideband Global Satellite (WGS).
- The VSAT network eliminates bandwidth deficiencies associated with the transmission of digital radiographs and other telemedicine applications between medical units with different levels of care in the USCENTCOM and AFRICOM.
- The Telemedicine network
  - Provides a transportable DISN two-way satellite service with access to the DISN backbone.
  - The Telemedicine service provides voice, video and data to the deployed user.

# U.S. President's Emergency Plan for AIDS Relief

- **$10 million public-private partnership (GSM Association Development Fund, Accenture Development Partners, Motorola, MTN and Voxiva) to leverage technology to connect health systems in 10 PEPFAR-supported countries by 2010**
- **Phones-for-Health to support treatment for 2 million HIV-infected people, support prevention of 7 million new infections, and support care for 10 million people infected and affected by HIV/AIDS in an accountable and sustainable way.**
- **System allows health workers to report data from the field using their mobile phones, as well as PCs and PDAs.**
- **Data is mapped and analyzed by the system and made immediately available to health authorities at multiple levels via the web.**
- **The system also supports SMS (text messaging) alerting and notification and tools for communication and coordination with field staff.**

# Phones for Health "Lite" Program

- Public-private partnership funded by PEPFAR & led by State Department's Office of the Global AIDS Coordinator

- Plan: leverage existing infrastructure in Tanzania to enable DoD to send outgoing SMS messages to active host nation military stationed in remote or cross-border areas

- Pre- and post-pilot surveys will target HIV knowledge & attitudes among military stationed in remote areas

- Status: funding allocated and a similar military-to-

# Summary

- Africa already has an expanding mobile phone market and provides an excellent opportunity to develop integrated mobile health information systems
- Wireless health care applications are evolving
  - Many innovative software solutions being developed (education/med references/remote diagnostics/disease management)
- US Government involvement (PEPFAR/USAID) in wireless health care is global – DoD hopes to partner with these other agencies
- Key focus for the Military Health System is to leverage current mobile health projects and partner with other public/private groups on the African continent to accelerate delivery of mobile health care solutions

# Potential Next Steps*

- Mobile health solutions to new Liberian battalions to support host nation medic training
  - Deliver traditional continuing medical education, scenario-based practical training, streaming video for procedures and just-in-time professional consultations for real world needs supporting Liberian Army medical readiness.
- Mobile health technology to support a regional surveillance and alarm system in Africa
  - Modify mHealth solutions that already exist within the US for surveillance integrating all nine African host nation public health and military health systems in support of Emerging Infectious Disease outbreak management and response

* Feasibility and acceptability of these projects yet to be vali

Questions?

Contact:
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301-619-7967
ron.poropatich@amedd.army.mil

# Backup

If you would like to join the Supercourse Network, obtain a CD of the Supercourse or to contribute a lecture, please contact Ronald LaPorte super1@pitt.edu

# Other DOD Technology Solutions

- Interoperable Communications Extension System (ICE-S)
  - Equipment suite comprises 3 main subsystems: deployable cellular base station, a radio bridge, and a Ku-band satellite terminal
  - Systems are interconnected so that cell phone users within range can communicate among themselves, be “patched” to hand-held and vehicular push-to-talk users in the area, or have connections to government and civilian telephones anywhere

Interoperable Communications Extension Syste

# Mobile Health Security

- Healthcare security
  - confidentiality (ensures correct disclosure)
  - data integrity
  - data availability (free from denial of service).
  - Authentication and confidentiality are especially difficult using wireless networks.
- Bluetooth has built-in encryption and authentication mechanisms based on authentication (prevents spoofing and unwanted access), and encryption (prevents eavesdropping and provides link privacy).
- Special Publication 800-124, titled “Guidelines on Cell Phone and PDA Security” is an overview of common cell phone and personal digital assistant devices, their associated risks and guidelines for mitigating the risks.
- DISA’s Wireless Security Technical Implementation Guide (STIG)
  - STIG Version 5, release 2 (15 November 2007) supports the design, implementation, and management of wireless devices and networks that are used to provide email and other information technology services to mobile workers in the DoD and provides implementation guidance for DoD Directive 8100.2 and ASD-NII 2 June 2006 memorandum providing supplemental policy and guidance to DoDD 8100.2.
  - Additional information on wireless systems can be found on the DoD Wireless Community of Practice Knowledge Management (CoP KM) Web site at http://acc.dau.mil. Select the “DoD Wireless” workspace from the main web page.

# Stability Operations
# Role for Cell Phone delivered Health Care?

- Definition: Military and civilian activities conducted across the spectrum from peace to conflict to establish or maintain order in States and regions.

- "It is DoD policy that stability operations are a core U.S. military mission that the Department of Defense shall be prepared to conduct and support. They shall be given priority comparable to combat operations and be explicitly addressed and integrated across all DoD activities…[1]"

- A critical concern in implementation of this Directive is to "Ensure DoD medical personnel and capabilities are prepared to meet military and civilian health requirements in stability operations."

- [1] DOD 3000.5, November 28, 2005 "Military Support for Stability, Security, Transition, and Reconstruction (SSTR) Operations", Section 4.1

# Public Health Disaster Consequences of Disasters

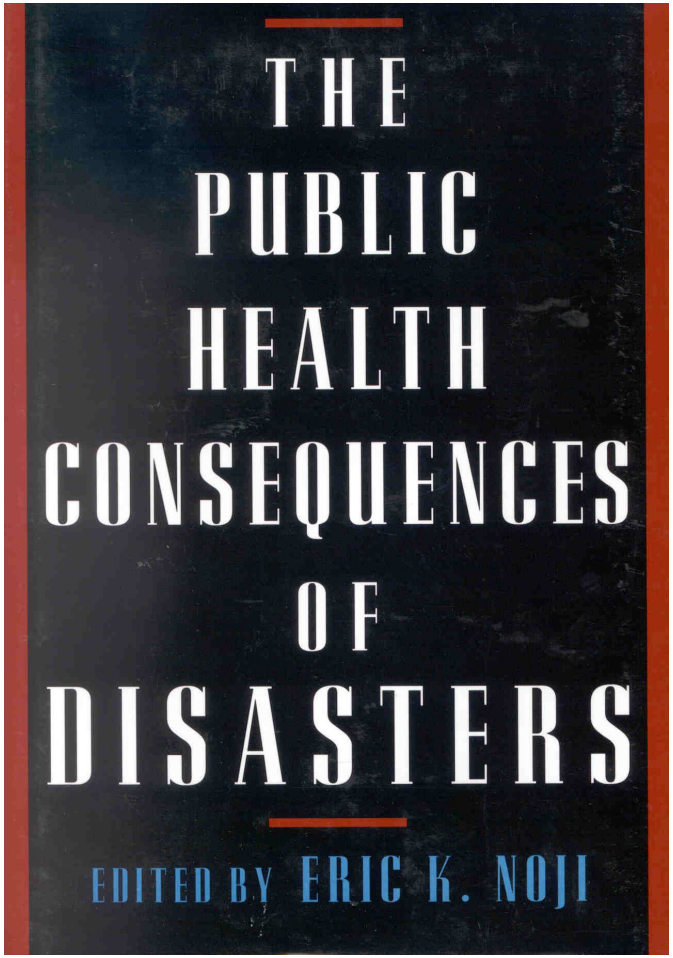
**Second Annual John C. Cutler Global Health Lecture**

**University of Pittsburgh**

**29 September 2005**

**Reached 136 countries via webcast**

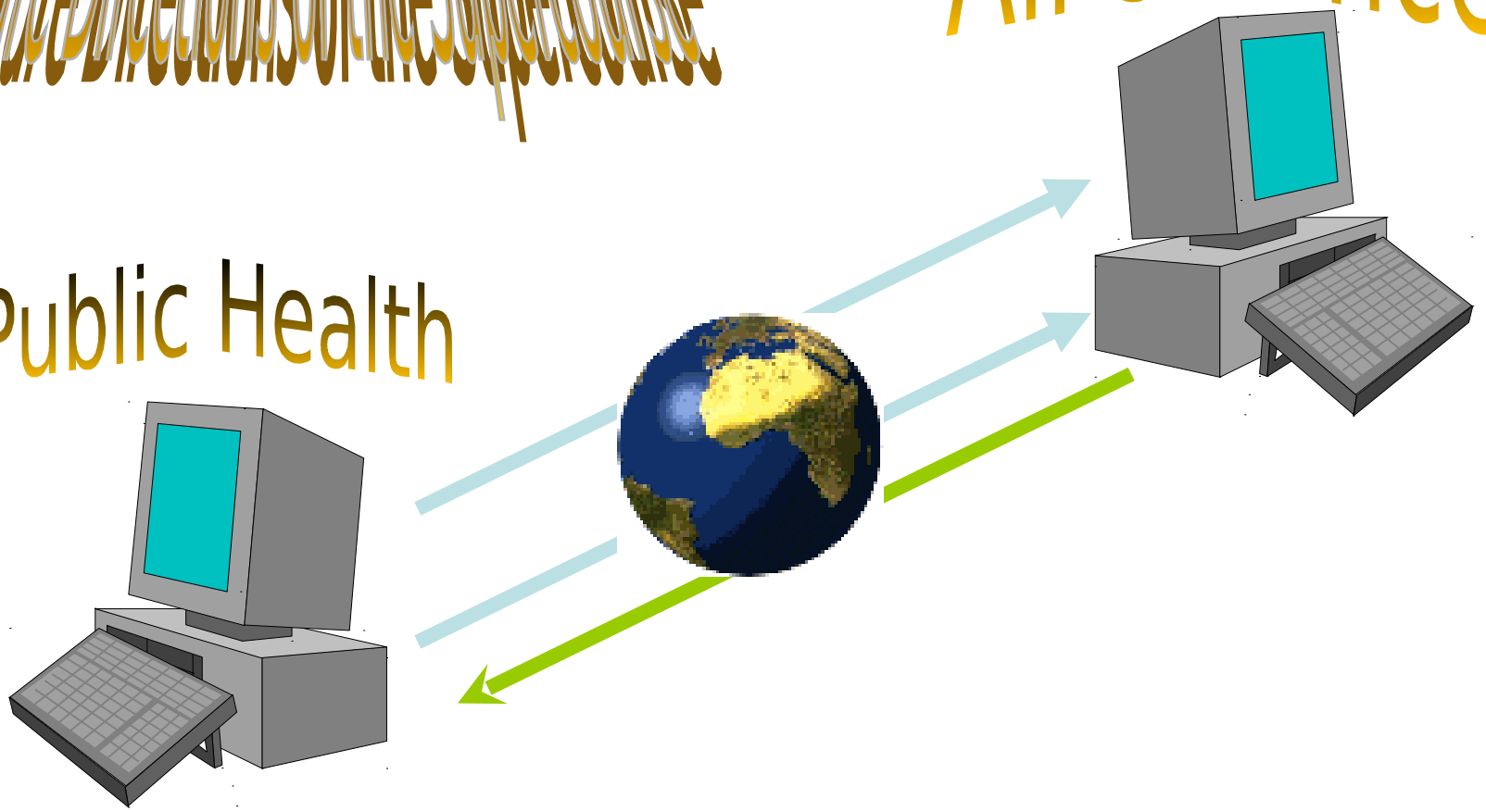
Eric K. Noji, M.D., M.P.H.



# Future Directions of the Supercourse

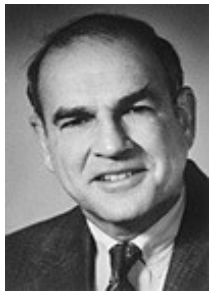
All Science

Public Health



Supercourse group is collaborating with the Library of Alexandria to reach the world with prevention message and to distribute Supercourse CDs to medical schools around the world

Joshua Lederberg (1958)

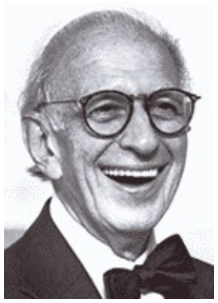


Baruch S. Blumberg (1976)

Ferid Murad (1998)

Gunter Blobel (1999)

# Nobel Prize Laureates in the Supercourse (Medicine)



Eric R. Kandel (2000)

Paul Greengard (2000)

Leland H Hartwell (2001)

Paul C Lauterbur (2003)

# Concept of Telepreventive Medicine

## Telepreventive medicine

Inexpensive Low to High bandwidth systems designed to reach large numbers of healthy people to prevent disease. “Teaches local people to fish” through empowering the local teachers.

## Telemedicine

Expensive High bandwidth systems designed to reach small numbers of sick people to cure disease.